CASE REPORTS

PERSISTENT LEFT SUPERIOR VENA CAVA WITH BILATERAL AZYGOS SYSTEM IN AN ADULT

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The condition to be described was discovered during routine dissecting-room work in a man aged 88, who had no history of any illness during life, and whose death was due to bronchopneumonia.

The left subclavian and internal jugular veins united in the neck to form a left superior vena cava which passed directly down over the arch of the aorta and the pulmonary trunk to lie between the left auricle anteriorly and the pulmonary vessels and bronchus in the root of the left lung posteriorly (Fig. 1). The vessel then turned to the right in the posterior part of the coronary sulcus and became continuous with the coronary sinus: its total length from origin to termination was 15 cm.

On the arch of the aorta, the left vena cava received the left internal mammary and superior intercostal veins, and just before its termination it was joined by the left marginal vein from the anterior part of the

FIG. 1.—The mediastinum from the left side showing the entry of the left superior intercostal vein into the persistent vessel. (a) Left superior vena cava; (b) left superior intercostal vein; the left azygos vein is posterior to the descending thoracic aorta; (c) thoracic aorta.

FIG. 2.—The mediastinum and great vessels from the front, showing the anastomotic channel between the two venæ cavæ. (a) Left superior vena cava; (d) arch of aorta; (e) communication between the two venæ cavæ.

atrio-ventricular sulcus. At its origin, the persistent vessel was 8 mm. in diameter; and this had increased to 13 mm. at the point of entry of the left superior intercostal vein, and to 21 mm. at its termination in the coronary sinus.

The grossly dilated coronary sinus opened into an enlarged right atrium through an opening 23 mm. in diameter. This opening lay immediately to the left of the opening of the inferior vena cava, and was devoid of a valve. The wall of the right ventricle was comparatively thin, but the rest of the heart appeared normal.

The left innominate vein was represented by a communicating channel which ran from the left superior vena cava along the roots of the vessels springing from the arch of the aorta to join the right innominate vein (Fig. 2.) The left superior intercostal vein drained all the interspaces of the left half of the thorax, and in its course over the aorta superficial to the left vagus nerve and superior to the root of the lung, formed a left-sided azygos system (Fig. 1). The azygos system of the right side was of the usual pattern, and the two systems were joined by an anastomotic vessel which crossed the mid-line behind the aorta and œsophagus at the level of the eighth thoracic vertebra.

There was no transposition of viscera either in the thorax or in the abdomen.

Discussion

The persistence of a left superior vena cava opening into the right atrium through the coronary sinus involves a simple deviation from the normal embryological pattern of development. The left anterior cardinal vein is not obliterated and opens into the left horn of the sinus venosus and thence into the right atrium.

The condition is not uncommon among cardiac abnormalities, but Prows (1943) points out that although over 200 abnormal *venæ cavæ* had been described, there are few descriptions of the relation of the venous drainage of the chest wall to the anomalous vessels. He found only five examples of bilateral *venæ cavæ* associated with bilateral azygos systems, and added a sixth. The azygos systems described in the present communication differed from those in Prows's case only in the anastomosis between the two sides at the level of the eighth thoracic vertebra. Embryologically it involves the persistence of the communication between the posterior and anterior cardinal veins on the left side where the latter joins the left horn of the sinus venosus. Detailed discussion regarding this anomaly has been adequately treated elsewhere (McCotter, 1916; Patten, 1953) and consequently is not elaborated here.

The dilatation of the persistent vessel and coronary sinus described in this case may be the result of increased blood flow in the vessel rather than any reflection of back pressure in the right atrium as was suggested by Walsham (1880). The atrophy of the valve is consequent upon its incompetence in guarding the dilated coronary opening, though valvular disappearance could also be due to increased resorption of sinus venosus tissue during development, as occurs in birds and reptiles in association with persistence of the left superior vena cava. Similar dilatation of the sinus was noted in one of the cases described by Campbell and Deuchar (1954).

While a persistent left vena cava joining the right atrium as described may not seem to be of any practical significance, *per se*, catheterization should not be performed from the left arm when the condition is present, as Campbell and Deuchar (1954) point out. Even though the catheter may reach the right atrium, in spite of the acute angle between the subclavian vein and the persistent vessel, its direction of entry makes manipulation from the atrium into the right ventricle and pulmonary trunk a more difficult procedure. Radiographically a catheter entering the right atrium from the right arm may pass along the coronary sinus and ascend the left cava, thus simulating radiographically an interatrial septal defect.

In view of the fact that the persistent vessel may play an important part in thoracic venous drainage, as shown in the case described, it should not be ligated at operation. The vessel usually drains into the right atrium, and the anastomosis between the superior *cavæ* on each side may be small or non-existent.

Increasing use of radiographic and catheterization techniques in cardiac investigations has led to more frequent detection in life of these conditions, and an awareness of the existence of the abnormalities that may occur is important in interpreting some results obtained.

Summary

A case is described in which bilateral superior venæ cavæ were associated with bilateral azygos systems. Some comments are made on the absence of the Thebesian valve in association with the persistence of a left superior vena cava, and the clinical implications of the latter.

I should like to thank Mr. Harold Baggett for taking the photographs.

References

- Campbell, M., and Deuchar, D. C. (1954). The left-sided superior vena cava. *Brit. Heart J.*, **16**, 423.
McCotter, R. E. (1916). Three cases of persistence of the left superior vena cava. *Anat. Rec.*, **10**, 371.
Patten, B. M. (1953). *Human Embryology*, 2nd ed., p. 680. Churchill, London.
Prows, M. S. (1943). Two cases of bilateral superior venæ cavæ, one draining a closed coronary sinus. *Anat. Rec.*, **87**, 99.
Walsham, W. J. (1880). Anatomical variations; a left superior vena cava. *St. Bart. Hosp. Rep.*, **16**, 93.